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| **Pretzel Predictions**  **How many pretzels can you eat in a minute???**  ***1.1.5 The student will explain factors that produce biased data.***  ***1.2.1 The student will identify meaningful, answerable scientific questions***  ***1.2.3 The student will formulate a working hypothesis.***  ***1.2.6 The student will identify appropriate methods for conducting an investigation (independent and dependent variables, proper controls, repeat trials, appropriate sample size, etc.)***  **Scientific Method Pre-test:**  Complete the pre-test on the scientific method and print out your answers.  <http://mset.rst2.edu/portfolios/l/lautz_s/Science%20Fair%20Handbook/SFquiz.html>   **Activity Information:**  This activity is going to walk you through the scientific method. The scientific method is something that you should use all the time. It is not something that you do in science but then forget it. The scientific method is good thinking. You should already be very familiar with this concept!  **Discussion:** Describe a time in your life when you used the scientific method.  **What are the parts (and definitions of the parts) of the scientific method?**  **Problem: How many pretzels can be eaten in one minute?**  **Hypothesis:**  **Materials:**   1. pretzels, bow-tie shaped (10) 2. stop watch   **\*\***A hypothesis should always contain a BECAUSE!!! It is not really a “guess”!  **Procedure:**   1. Obtain a cup of pretzels and a timer. 2. Choose one person in your group to be the “eater” 3. Choose one person to be the timer. 4. Time how many pretzels can be eaten in a minute! 5. Complete three trials for the SAME person. 6. If another person wants to try – they may. 7. Record all data on a neat data chart.   **Data:** Create a chart below that will organize your data. Make sure you have a column for average!  **Class Data:** Collecting data from more experiments increases the validity of the data! Create a chart for class data.  **Graph:** Data alone says nothing. We researchers need to make sense of the data by graphing, completing statistical analysis or other processes.  **Analysis/Conclusion:** Now you have to explain the data! What is the overall average number of pretzels a person can eat in one minute? Why can’t they eat more?  **Teacher Instructions:**   * Be sure to follow all safety procedures when handling food. Be aware of student health and dietary concerns. Eating is optional. * This lab can be used to discuss bias – students usually overestimate what they are capable of!! * The best pretzels for this activity are the large (2" x 3") bow-tie shaped pretzels sold in bags. There are usually sixty to seventy in a bag. Students usually make a mess eating the pretzels at a hurried rate. Perform this activity in an area where the cleanup of pretzel crumbs will not be a major chore. You might want to have drinks available for the participants. You may want to start with a quick pretest of the concept of the scientific method. * After students have finished their predictions, have students share what they are. Once this is done, inform the students that certain chemicals are added to pretzels during the manufacturing process to assure the complete dryness of the interior of the pretzels. Does that make them want to change their prediction?  For a start, give each contestant five pretzels. Assure them that you have plenty more. You will give them more as soon as they have the first five chewed and swallowed.  Start the stop watch and allow the contestants to begin chewing. On a rare occasion a student will be able to chew and swallow more than five pretzels in a minute. Most will only be able to swallow two or three. Why? It requires only a portion of one pretzel to absorb all of the saliva in a student's mouth.  Predicting is a skill a person needs to develop to become a successful scientist. Students should notice how predictions change as more information is made available. The experience with eating a portion of a pretzel and information given about the additives should have motivated them to change their predictions.  Scientists gather as much information as they can before making predictions. As new information is made available to them, they often change their predictions.   Modified from <http://www.mcrel.org/whelmers/whelm46.asp> |  |